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**VIA ELECTRONIC CORRESPONDENCE**

February 8, 2016

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File No: 8.DC.20.19

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RE: DOJ No. 90-5-1-1-4022/1  
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**RE: Consent Decree (Case: No. 1:12-cv-24400-FAM)**  
**Reference DOJ Case No. 90-5-1-1-4022/1**  
**Section VI – Specific Capital Improvement Projects, Paragraph 19(i)**  
**Section XX – Modification**  
**Request for Non-Material Change – CD Project 2.14 & 2.15 - Digesters Plants 1 and 2**

Dear Sir/Madam:

Pursuant to our discussions during our December 4, 2015 teleconference, Miami-Dade County (County) respectfully requests to modify the scope of work for Appendix D-2, CD Project 2.14 & 2.15 – Digesters Plant 1 and 2. Attached for your review and approval is a technical memorandum outlining the requested non-material change to Project 2.14 and 2.15. This technical memorandum summarizes the presentation made by Water and Sewer Department (WASD) to the United States Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) at that meeting.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Should you have any questions regarding this matter, please call me at (786) 552-8120.

Sincerely,



Bertha Goldenberg, P.E., LEED® Green Associate  
Assistant Director, Regulatory Compliance and Planning

Attachments: CD Project 2.14 & 2.15 – Digesters Plant 1 and 2 Technical Memorandum

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To	Manuel Moncholi
CC	Pedro Hernandez, PE, Maricela J. Fuentes, PE, Brian Stitt
Subject	CD PROJECT # 2.14 and 2.15, PCTS: 13159 Digesters Plant 1 and Plant 2
From	John Ososkie, PE / Consent Decree PMCM Team
Date	January 21, 2016
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## Technical Memorandum

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### 1. INTRODUCTION

Miami-Dade Water and Sewer Department (WASD) is faced with the dual challenges of providing increased treatment capacity for growth while also achieving more stringent discharge requirements at each of their wastewater facilities. Both challenges must be met using the aged infrastructure of the existing plants. The principal components of the system were constructed in the 1950s and 1960s. The South District Wastewater Treatment Plant (SDWWTP) recently completed an expansion to include high level disinfection treatment facilities, but the last major expansion and upgrades to the North District Wastewater Treatment Plant (NDWWTP) and Central District Wastewater Treatment Plant (CDWWTP) were completed in the 1980s.

The CDWWTP is WASD's oldest existing wastewater treatment facility. The plant is located on Virginia Key and was originally constructed in 1956. The plant has undergone numerous expansions and upgrades from its original permitted capacity of 47 million gallons per day (mgd) as a modified activated sludge process to its current configuration as a 143 mgd average annual daily flow (AADF) high-purity oxygen activated sludge facility. The CDWWTP has two separate liquid process treatment streams - Plant 1 and Plant 2. Plant 1 is rated at 60 mgd AADF and Plant 2 is rated at 83 mgd AADF.

At the May 21, 2013 Board of Miami-Dade County Commissioners (BCC) meeting, the BCC approved the Consent Decree (CD) that had been negotiated with the United States Environmental Protection Agency (EPA), the United States Department of Justice (DOJ) and the State of Florida Department of Environmental Protection (FDEP). The CD outlines the activities to be undertaken to reduce exceedances of treated effluent limitations. This includes rehabilitation and improvements at each of the treatment plants owned by WASD. All improvement projects to these plants must be completed on or before 15-years from the date of lodging (04/09/2013) of the CD with the United States District Court. A series of condition assessment reports outlining the current state of plant treatment facilities have been prepared – one for each WWTP. These documents form the basis for required projects that will be undertaken by WASD. Projects specific to the CDWWTP are listed within the Appendix D-2 of the CD. Rehabilitation of the digesters is identified as Project Nos. 2.14 and 2.15 in the CD.

### 2. EXISTING CONDITIONS AND PROJECT OVERVIEW

The "Existing Conditions Report - Upgrades to the Central District Wastewater Treatment Plant - Work Order No.1" dated September 2008 and updated in 2012, identified all the digesters as critical areas in need of rehabilitation and repair. There are four digester clusters each with four digester tanks located at Plant 2, and two more clusters of four digesters tanks at Plant 1, for a total of 24 digesters. The digesters stabilize the

biosolids generated by the CDWWTP treatment process through mesophilic digestion. Each cluster of digesters has an associated Digester Cluster Control Building that houses the sludge digestion equipment (e.g., pumps, blowers, heat exchangers, etc.) piping, appurtenances, and electrical and instrumentation panels.

The majority of the equipment, piping, and valves within the Digester Cluster Control Buildings are in poor condition and/or require immediate replacement under the improvements plan. Internal meetings with plant operation and maintenance (O&M) staff suggest the existing yard piping that is associated with the anaerobic digesters is also in poor condition and in need of replacement. Similar to the equipment located in the Digester Cluster Control Buildings, a majority of the electrical and instrumentation panels and components are past their useful life, and in need of replacement.

The digester tank covers have been rebuilt and repaired several times to keep them in service. The covers are in need of replacement. Additionally, the piping and equipment internal to the digesters tanks (e.g., mixing systems, recirculation pumps, gas handling facilities, etc.) are in varying stages of operability and/or in need of major maintenance, and should be replaced where necessary.

The operation of the equipment and systems associated with each of the digester clusters has become a challenge, due to the equipment limitations and changes to the original system. Currently, the inoperability and equipment age within the digester system is impacting the ability to provide the level of service required and stressing the treatment system capacity.

### 3. BASIS OF DESIGN REPORT

The facility currently uses mesophilic anaerobic digestion (MAD) for sludge stabilization. About 40% of the generated thickened solids currently go to Plant 1, while the remaining goes to Plant 2. In total there are 24 total digesters, each is 105 ft diameter with volume of approximately 1.2 to 1.7 million gallons depending on the operating liquid level of the digester which has a side water depth (SWD) ranging from 17.9 to 25.9 ft not including the volume in the 3 ft cone section. Currently most of the digester clusters operate with two primary digesters that are heated and mixed and two secondary digesters which are unheated and unmixed. One exception is Plant 2, Cluster 2 which uses three primary digesters and one secondary digester. Another exception is Plant 2, Cluster 4 which currently operates with one primary digester and three secondary digesters. Digesters 15 and 16 in Plant 2, Cluster 4 receive sludge from all digesters and provide the buffer between digestion and dewatering.



Figure 1: Typical Digester Cluster Configuration

The current recommendation by MWH is to upgrade CDWWTP to high rate mesophilic anaerobic digestion and details regarding the design are provided in the Cluster 1 BODR (April, 2015) and Cluster 4 BODR (August, 2015) prepared by MWH.

To determine the number of digesters that would need to be in operation for the high rate anaerobic digestion alternative and the downstream dewatering impacts, the following design assumptions were made:

- Minimum SRT of 15 days at Design Conditions with one digester out of service to meet the minimum EPA PSRP standard for Class B biosolids
- Nominal Digester Volume ~ 1.6 Mgal/digester based on previous evaluations by WASD assuming operating at one foot below the maximum operating water level (SWD = 24.9 ft).
- Maximum Volatile Solids Loading Rate (SLR) – 0.2 lb VS/ft<sup>3</sup> (WEF MOP-8, 2010)
- Digester VSR = 55% based on historical plant records and calculations made by MWH (February, 2015).
- Centrifuge Dewatering Sizing – 190 gpm (Based on sizing in MWH Technical Memorandum No. 2.2 “Thickening/Dewatering Process Technology Alternatives Development and Evaluation” for CDWWTP – draft, July 2015)

The results of the sizing analysis are presented in Table 1.

**Table**

**Table 1: High Rate MAD Digester Sizing Analysis**

Mesophilic Digester Design	Units	Current AA	Year 2025 AA	Past Year 2025 AA	Design
Mass Throughput	lb/d	208,050	223,044	173,324	332,500
Hydraulic Throughput	MGD	0.454	0.486	0.378	0.725
# of Digesters Required <sup>1</sup>	Units	5	5	4	7
Total Digester Volume	Mgal	8.1	8.1	6.5	11.3
Digester SRT	days	17.8	16.6	17.1	15.6
Digester Solids Loading Rate	lb VS/ft <sup>3</sup>	0.15	0.16	0.15	0.17
Digester VSR	% VSR	55.0%	55.0%	55.0%	55.0%
Digested Sludge Production	lb/d	119,502	127,520	101,044	191,091
Dewatering Hydraulic Throughput	gpm	307.6	329.7	256.4	491.6
# of Dewatering Centrifuges	Units	1.6	1.7	1.3	2.6

<sup>1</sup> Does not include a redundant digester

**Table 1** shows that for this configuration, at least seven digesters would need to be in operation to maintain greater than 15 days SRT at the permitted capacity design conditions. This would require two digester clusters to be available to provide at least one redundant digester at permitted capacity design conditions.

At the projected future average annual loadings, only four to five digesters need to be in operation so two clusters provides extra capacity at those conditions. At the 96 percentile 7-day average conditions in year 2025 (before the West District WWTP is online) six digesters would need to be in operation to maintain greater than 15 days SRT.

WASD has elected to have three available clusters in the future to provide extra capacity for digestion and sludge storage. Having a third cluster available would also facilitate maintenance of the equipment and

systems in one of the cluster's dedicated Control Buildings. One digester has the ability to provide up to 2.2 days of storage at peak design conditions. If all 24 digesters are in operation then the SRT would be over 53 days. If all 16 digesters in Plant 2 are in operation then the SRT would be over 35 days. This indicates that there is excess capacity available beyond what is needed. Although retrofitting all of the clusters would provide extra redundancy and potentially modest increases in VSR, significant capital savings could be realized with only retrofitting the needed capacity. Furthermore it has been shown that long SRTs in digestion can generate extracellular polymeric substances which can inhibit dewatering performance (Novak et. al., 2004).

#### **4. CONCLUSIONS**

**Table 1** summarizes the results of operating the high rate MAD process at Central District at design future flows with a volume per digester of 1.6 Mgal. The results show that two clusters is still sufficient to maintain the minimum SRT and SLR for high rate MAD and the number of digesters needed in operation does not change at average operating conditions.

The results of the sizing analysis show that for high rate MAD, two clusters would be sufficient at the average or at the permitted capacity design conditions. The two clusters would be sufficient for normal expected operating conditions at all ranges of the digester volume but three clusters will be rehabilitated to provide additional capacity for the permitted design condition. Rehabilitating three clusters, would also provide excess capacity for sludge storage and would facilitate maintenance of the equipment and systems in one of the cluster's dedicated control buildings.

#### **5. RECOMMENDATION**

The CD PMCM Team recommends a non-material modification of the Consent Decree project as follows:

- Re-scoping of CD Project 2.14 – Based on Engineer's evaluation no additional work will be performed on Digester Clusters 1 and 2.
- CD 2.15 Digesters Plant 2 – Complete rehabilitation of Clusters 1, 2 and 3 (12 digesters including roof, concrete structures, recirculation & transfer pumps, mixers & electrical systems).